SCORECARD

GENERAL DESCRIPTION & INSTRUCTIONS

Background

Since the spring of 2008, leaders of the five major engineering societies representing over one million members have been meeting to identify practical steps the country can take toward managing greenhouse gas emissions, a key issue in the climate change debate. The group has selected the Scorecards approach as a tool for assessing the merit of various greenhouse gas management options. The Scorecards developed so far focus on electric power and transportation systems.

The objective of the Scorecard approach is to identify options that could be implemented in sufficient quantity to generate a significant reduction in greenhouse gases (GHG's) in the 2020 and 2050 timeframes. In general, options for 2020 timeframe will be different from those that become important in 2050.

The nomenclature used here and in the scorecards is:

- **Options:** Technologies and/or other measures that could reduce GHG emissions
- **Attributes:** A set of indicators (metrics) used to "grade" each Option; in combination, they yield a relative (compared to other options in the same scorecard) potential for success in a timely manner.

The Scorecards employ a simple A, B, C, D and E grading system (similar to that used in many schools) for the Attributes. The Electric Power Scorecard rates major types of power sources, including coal, gas, and renewables using several Attributes. The Transportation Scorecard rates various transportation systems, using traditional or new fuel sources and technologies, by the same set of Attributes. The Attributes include items such as technical issues, cost, environmental and risk issues, and timing of significant implementation.

The initial list of Options and Attributes was developed by the Carbon Management Committee and the participants at the workshop on Gaps & Barriers. These Options and Attributes were used to evaluate implementation of promising power generations and transportation options. The Options indicated on the Scorecards are not fixed, but merely a starting point.

The common Attributes and the scoring approach are given below:

1. **GHG Reduction Potential:** To what extent can the Option reduce U.S. GHG emissions? For example, is the reduction per unit cost large or small compared to other Options?

2. **Technology**: This Attribute includes
   - o Technical Readiness – Is the Option proven to be functional or is further development – R&D, Pilot Studies – required?

- Market Readiness -- Is the Option already in commercial use or does it require further development before it becomes commercially available? Does the supply chain capacity exist to support the Option?
- Infrastructure Availability – What magnitude of infrastructure revisions, changes or additions are needed to support the Option? Are massive and key changes (or adaptations) in habits or infrastructure required?

3. **Financial**: This includes the Total Cost of developing and implementing the Option.
   - Capital and O&M costs, using private business decision criteria. Costs should not include carbon taxes, costs of allowances, or government subsidies.
   - Costs of requisite infrastructure changes
   - Impact on the economy and cost of living
   - To what extent is government subsidies needed to implement the Option?

4. **Environmental**: This includes all of the various environmental implications of the Option in particular,
   - Land Use Commitment – What impact does the Option have on land usage? As an example, will the Option change deciduous forest to suburban development thereby decreasing GHG limiting capacity?
   - Water Use Commitment – How does the Option impact water usage and water supply systems (e.g., potable water supply)?
   - Air Quality Impact – How does the Option impact air quality over and above GHG emissions (e.g., all other non-GHG issues such as increased ozone and acid rain)?

5. **Risk**: Defines those items that are a risk to development, implementation or operation of the Option including:
   - Reliability – Does the Option have intrinsic complexity that could result in frequent failures?
   - Safety - Is the Option safe or is there an inherent or perceived risk?
   - Expected Future Growth – What is the likelihood that the Option will grow in usage and can be expanded to further markets?
   - Impediments to Growth – Is the infrastructure and supply chain available? Is the expertise, including engineers and construction personnel, available to develop and implement the Option? Are there sufficient numbers of engineers, construction, and operating personnel to implement the Option? Are the educational institutions available to train engineers, construction, and operating personnel to implement the Option? Is there sufficient raw material and feedstock to support the Option?

6. **Social-Political**: These are non-technical issues that are critical to the implementation and operation of an Option including:
   - Public Willingness to Support – How the public views the Option and is willing to support it both vocally and with resources.
   - Neighborhood Acceptance (i.e., NIMBY) – Willingness of the public to encourage and accept the alternative within their immediate area including various associated physical changes (e.g., new roads and/or rail lines).
   - Energy Security – How much does the Option reduce the imports of foreign oil?
   - Regulatory/Legal Framework to Enable – Are new statutes or regulations required?
   - Litigation Potential - Does the Option create a likelihood of protracted litigation?

- Permitting - Are significant modifications or new permit applications and/or permits required?
- Social Impacts - Changes to human and labor rights; rural and social development revisions; potential for increased income; and, quality of life impacts. Do actions risk the loss of some species or promote one species over another? How does the Option impact the availability and supply of food?

7. **Implementation Timing**: To what extent can the Option be implemented by 2020 and 2050 taking into account all of the Attributes?

While the major Attribute categories are common to all scorecards, some adjustments in the definitions may be necessary for each specific set of technologies/measures (Options) being scored. The customized definitions of Attributes and Options are presented with the Description and Instructions for each sector's scorecard table.

Comments Column

This field is for any additional information and data the rater wants to include, e.g., providing cost data for the Financial Category. The Rater should also feel free to elaborate on the definitions of the Options and Attributes. The Rater may also add additional Options or Attributes.

Ratings

The ratings (Score) use a simple A, B, C, D and E-system similar to those grades received in school. In this case though, the higher the grade the more favorable the rating of the Attribute – A is best and E is worst. Enter **NA** for "not applicable" and **U** for "unknown."

Important: When completing the Scorecard the Rater should use a base year of 2005 for all Options and Attributes. 2005 was selected based on current federal goals.